

CLAIMS

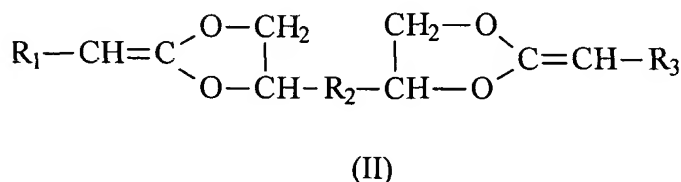
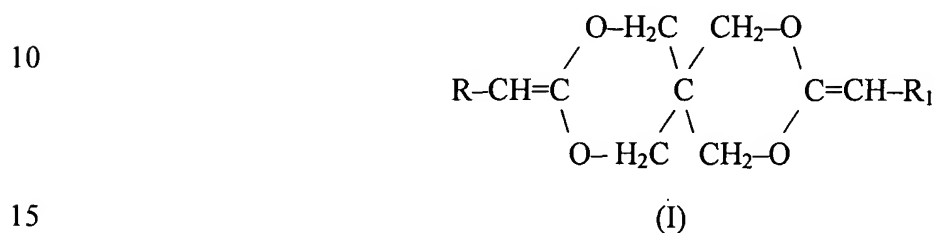
WHAT IS CLAIMED IS:

1. A medical article, comprising an implantable substrate having a coating deposited on the substrate, the coating comprising a polymer, the polymer being a product of co-

5 polycondensation of a diketene acetal and a diol.

2. The article of Claim 1, wherein the implantable substrate is a stent.

3. The article of Claim 1, wherein the diketene acetal is selected from a group of compounds having formulae (I) or (II):



wherein R, R₁, R₃ and are, independently, unsubstituted or substituted straight-chained,

20 branched, or cyclic alkyl radicals C₁-C₈, or unsubstituted or substituted aryl radicals; and R₂ is a straight chain or branched C₁ to C₁₆ alkyl group or a straight chain or branched C₁ to C₁₆ alkyl group containing an ether group.

4. The article of Claim 1, wherein the diketene acetal is selected from a group consisting of 3,9-diethylidene-2,4,8,10-tetraoxaspiro-[5,5]-undecane, 3,9-dipentylidene-2,4,8,10-tetraoxaspiro-[5,5]-heptadecane, 3,9-dibutylidene-2,4,8,10-tetraoxaspiro-[5,5]-pentadecane, 3,9-dipropylidene-2,4,8,10-tetraoxaspiro-[5,5]-tridecane, and mixtures thereof.

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5. The article of Claim 1, wherein the diol comprises aliphatic, cycloaliphatic, aromatic, or organosilicon diols or blends or combinations thereof.

6. The article of Claim 5, wherein the aliphatic diols comprise alkylene glycols or oligoalkylene glycols.

5 7. The article of Claim 6, wherein the alkylene glycols are selected from a group consisting of ethylene glycol, 1,2-propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, 1,12-dodecanediol, 1,13-tridecanediol, 1,14-tetradecanediol, 1,15-pentadecanediol, 1,16-hexadecanediol, 1,3-propylene glycol, butane-1,3-diol, pentane-2,4-diol, hexane-2,5-diol, and
10 mixtures thereof.

8. The article of Claim 6, wherein the oligoalkylene glycols are selected from a group consisting of trimethylene glycol, tetramethylene glycol, pentamethylene glycol, hexamethylene glycol, poly(tetramethylene glycol), diethylene glycol, triethylene glycol, tetraethylene glycol, poly(tetraethylene glycol), poly(pentaethylene glycol), poly(hexamethylene
15 glycol), poly(propylene glycol), and mixtures thereof.

9. The article of Claim 5, wherein the cycloaliphatic diols are selected from a group consisting of *trans*-cyclohexanedimethanol, *cis*-cyclohexanedimethanol, 1,2-cyclobutanediol, 1,3-cyclobutanediol, 1,2-cyclopentanediol, 1,3-cyclopentanediol, 1,2-cyclohexanediol, 1,3-cyclohexanediol, 1,4-cyclohexanediol, 1,2-cycloheptanediol, 1,3-cycloheptanediol, 1,4-cycloheptanediol, caprolactone diol, and mixtures thereof.
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10. The article of Claim 5, wherein the aromatic diols are selected from a group consisting of *p*-benzenedimethanol, *o*-benzenedimethanol, *m*-benzenedimethanol, and mixtures thereof.

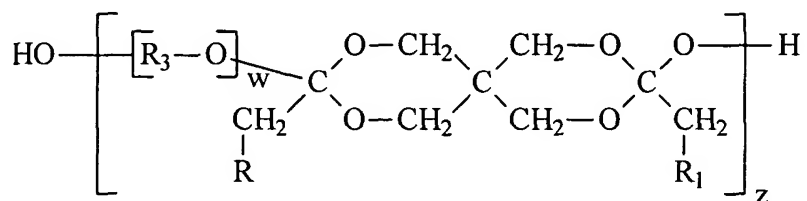
11. The article of Claim 5, wherein the organosilicon diol is a carbinol-terminated poly(dimethyl siloxane).

12. The article of Claim 1, wherein a hydroxylated functional compound is additionally included in the polycondensation process.

5 13. The article of Claim 12, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or
10 mixtures thereof.

14. The article of Claim 13, wherein the poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).

15. A medical device, comprising a coating, the coating comprising a polymer
15 including a unit having a formula:



wherein:

R and R₁ are, independently, unsubstituted or substituted straight-chained, branched, or cyclic alkyl radicals C₁-C₈, or unsubstituted or substituted aryl radicals;

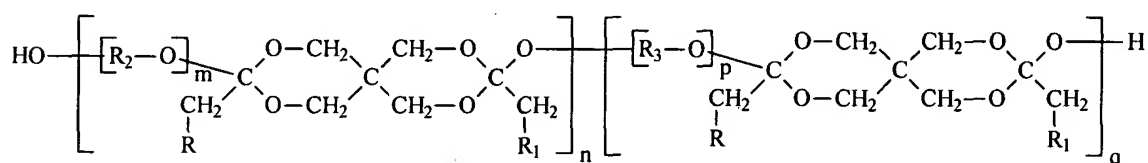
20 R₃ is an aliphatic, cycloaliphatic, aromatic, or organosilicon group; and

“w” and “z” are integers, where the value of “w” is between 1 and 40, the value of “z” is between 9 and 700.

16. The device of Claim 15, wherein the aliphatic radicals are selected from a group consisting of *n*-butyl and *n*-hexyl.

5 17. The device of Claim 15, wherein the cycloaliphatic radicals are selected from a group consisting of *trans*-cyclohexyl and *cis*-cyclohexyl.

18. The device of Claim 15, further comprising a polymer having a formula



wherein:

10 $\text{R}_2\text{-O}$ is a non-fouling moiety derived from a hydroxylated functional compound;

R_3 is an aliphatic or cycloaliphatic group;

“m,” “n,” “p,” and “q” are all integers, where the value of “m” is between 5 and 500, the value of “n” is between 2 and 350, the value of “p” is between 1 and 20, and the value of “q” is between 10 and 550.

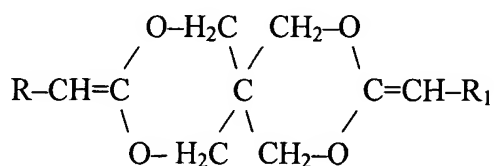
15 19. The device of Claim 18, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or
20 mixtures thereof.

20. The device of Claim 19, wherein poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).

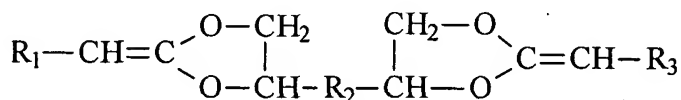
21. A method for fabricating a coating for an implantable medical device, the method comprising applying a polymer onto the surface of the device, wherein the polymer comprises a product of co-polycondensation of a diketene acetal and a diol.

22. The method of Claim 21, wherein the medical device is a stent.

23. The method of Claim 21, wherein the diketene acetal is selected from a group of compounds having formulae (I) and (II):



(I)



(II)

wherein R, R₁, R₃ and are, independently, unsubstituted or substituted straight-chained, branched, or cyclic alkyl radicals C₁-C₈, or unsubstituted or substituted aryl radicals; and R₂ is a straight chain or branched C₁ to C₁₆ alkyl group or a straight chain or branched C₁ to C₁₆ alkyl group containing an ether group.

24. The method of Claim 21, wherein the diketene acetal is selected from a group consisting of 3,9-diethylidene-2,4,8,10-tetraoxaspiro-[5,5]-undecane, 3,9-dipentylidene-2,4,8,10-tetraoxaspiro-[5,5]-heptadecane, 3,9-dibutylidene-2,4,8,10-tetraoxaspiro-[5,5]-pentadecane, 3,9-dipropylidene-2,4,8,10-tetraoxaspiro-[5,5]-tridecane, and mixtures thereof.

25. The method of Claim 21, wherein the diol comprises aliphatic, cycloaliphatic, aromatic, or organosilicon diols or blends or combinations thereof.

26. The method of Claim 25, wherein the aliphatic diols comprise alkylene glycols or oligoalkylene glycols.

5 27. The method of Claim 26, wherein the alkylene glycols are selected from a group consisting of ethylene glycol, 1,2-propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, 1,12-dodecanediol, 1,13-tridecanediol, 1,14-tetradecanediol, 1,15-pentadecanediol, 1,16-hexadecanediol, 1,3-propylene glycol, butane-1,3-diol, pentane-2,4-diol, hexane-2,5-diol, and
10 mixtures thereof.

28. The method of Claim 26, wherein the oligoalkylene glycols are selected from a group consisting of trimethylene glycol, tetramethylene glycol, pentamethylene glycol, hexamethylene glycol, poly(tetramethylene glycol), diethylene glycol, triethylene glycol, tetraethylene glycol, poly(tetraethylene glycol), poly(pentaethylene glycol), poly(hexamethylene
15 glycol), poly(propylene glycol), and mixtures thereof.

29. The method of Claim 25, wherein the cycloaliphatic diols are selected from a group consisting of *trans*-cyclohexanedimethanol, *cis*-cyclohexanedimethanol, 1,2-cyclobutanediol, 1,3-cyclobutanediol, 1,2-cyclopentanediol, 1,3-cyclopentanediol, 1,2-cyclohexanediol, 1,3-cyclohexanediol, 1,4-cyclohexanediol, 1,2-cycloheptanediol, 1,3-cycloheptanediol, 1,4-cycloheptanediol, caprolactone diol, and mixtures thereof.
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30. The method of Claim 25, wherein the aromatic diols are selected from a group consisting of *p*-benzenedimethanol, *o*-benzenedimethanol, *m*-benzenedimethanol, and mixtures thereof.

31. The method of Claim 25, wherein the organosilicon diol is a carbinol-terminated poly(dimethyl siloxane).

32. The method of Claim 21, wherein a hydroxylated functional compound is additionally included in the polycondensation process.

5 33. The method of Claim 32, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or
10 mixtures thereof.

34. The method of Claim 33, wherein the poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).